

CLAIMS

We claim:

1. A controlled polymerization process for (co)polymerization of radically polymerizable ionic monomers, comprising:
 - initiating the polymerization of free radically (co)polymerizable ionic monomers in the presence of a system initially comprising:
 - a transition metal complex, and
 - an initiator comprising a radically transferable azide group.
2. The process of claim 1, wherein the system further comprises an excess of one or more uncomplexed ligand.
3. The process of claim 2, wherein the uncomplexed ligand is at least one of a donating solvent and a ligand substitute.
4. The process of claim 1, further comprising initiating the polymerization of nonionic monomers and wherein the mole ratio of ionic monomers to non-ionic monomers is greater than 0.1 mole %.
5. The process of claim 4, wherein at least a portion of the nonionic monomers are polar monomers.
6. The process of claim 1, wherein the initiator is a macroinitiator.
7. The process of claim 6, wherein the macroinitiator is water soluble.
8. The process of claim 1, wherein the ionic monomer is anionic.
9. The process of claim 1, wherein the ionic monomer is cationic.
10. The process of claim 1, wherein the system further comprises a solvent.

11. The process of claim 10, wherein the solvent is water.
12. The process of claim 10, wherein the solvent is a mixture of solvents comprising water.
13. The process of claim 12, wherein the solvent is a mixture of water and at least one of pyridine and methanol.
14. The process of claim 10, wherein at least a portion of the solvent forms a complex with at least a portion of the transition metal.
15. The process of claim 1, wherein the initiator comprises a second functional group.
16. The process of claim 15, wherein the second functional group is a primary azide.
17. The process of claim 15, wherein the second functional group is an ionic functional group.
18. A controlled polymerization process for the preparation of water soluble block copolymers comprising:
 - polymerizing radically (co)polymerizable monomers in the presence of a system initially comprising:
 - a water soluble macroinitiator, and
 - a transition metal complex comprising one or more ligands.
19. The process of claim 18, wherein the water soluble macroinitiator is prepared by a controlled radical polymerization process.
20. The process of claim 18, wherein the water soluble macroinitiator is prepared by a process comprising:

reacting a macromolecule with a pendent or terminal hydroxy group with a molecule comprising a free carboxylic acid using catalytic amounts of dicyclohexylcarbodiimide and a base as condensing agent.

21. The process of claim 18, wherein water is present as a solvent.
22. The process of claim 18, wherein the radically (co)polymerizable monomer comprises an ionic functionality.
23. The process of claim 18, wherein the radically (co)polymerizable monomer comprises an ionic functionality.
24. The process of claim 18, wherein the radically (co)polymerizable monomers comprise functionality that can be converted into ionic functionality.
25. A polymer prepared by the process of claim 18.
26. A HEMA-b-DMAEMA polymer prepared by the process of claim 18.
27. A PEO-b-DMAEMA polymer prepared by the process of claim 18.
28. A PEO-b-vinylbenzoate polymer prepared by the process of claim 18.
29. A PEO-b-MAOETMAT polymer prepared by the process of claim 18.
30. A PEO-b-TMAEMT polymer prepared by the process of claim 18.
31. A block copolymer, consisting of water soluble polymeric blocks.